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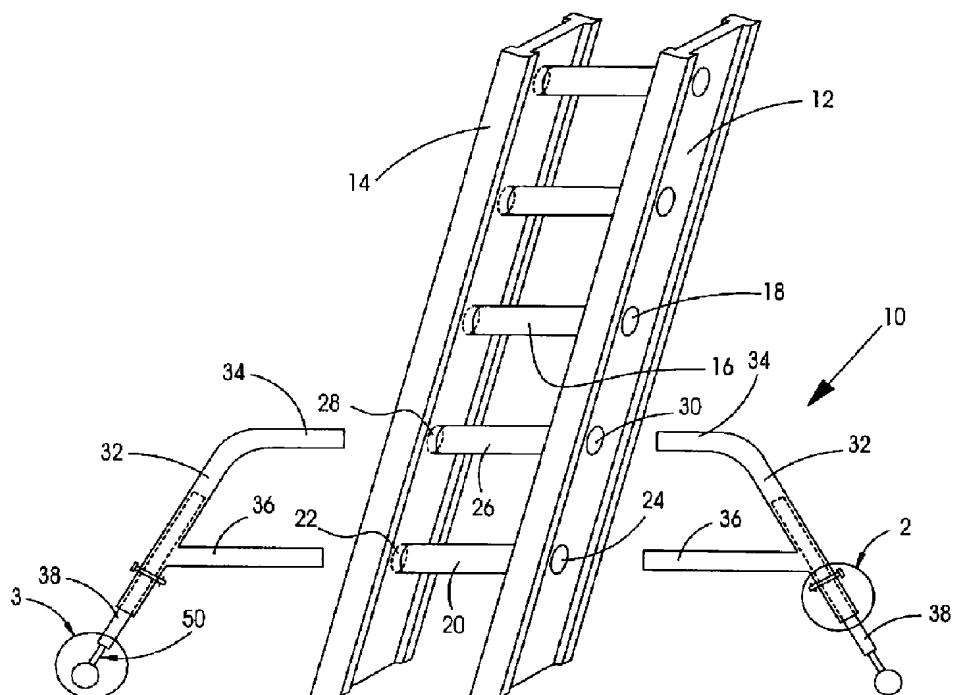
(54) STABILISATEUR POUR ECHELLE
(54) LADDER STABILIZER

(57)

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ABSTRACT OF THE INVENTION

A ladder stabilizing device for removable attachment to a lightweight extension ladder which includes two braces. Each brace has two parallel connection members that engage the lowermost hollow rungs and a support member connected to the connection members which extend downwardly and outwardly to engage the ground and increase the lateral support base of the ladder. The distinctive feature of the device lies in its dual extension adjustment which includes a telescoping and pin-lock structure for a fast and coarse extension adjustment and a screw-threaded connection for an accurate and fine extension adjustment. The structure is simple, functional and user-friendly.

LADDER STABILIZER**TECHNICAL FIELD**

The invention relates to ladder stabilizing devices and, more particularly, to a ladder stabilizing device for use with an extension ladder having hollow rungs to give the extension ladder additional lateral stability.

10 BACKGROUND OF THE INVENTION

Aluminium extension ladders have been used for years to gain access to high places. For lightweight and practical transport, storage and use, they are consistent in width from top to bottom, that width generally being a mere fifteen or so inches and consequently, stability decreases as the extension increases. Therefore, it is common practice to ask the assistance of another person to hold an extension ladder during use because those ladders feel unsafe on their own. Safety codes, in many jurisdictions, require that ladders be tied off at the top to secure them. However, reaching the top of an untied ladder to secure it is, in itself, unsafe.

Members for stabilizing ladders are known in the art. Some ladder stabilizers consist of stand-off

members positioned near a top of the ladder with arms that extend inwardly from the ladder to rest on a structure against which the ladder is leaned to support the ladder away from the structure. These stand-off 5 members can extend beyond the side rails of the ladder and provide some lateral support for the top portion of the ladder. However, such stand-off members provide no lateral stability at the base of the ladder.

Some ladders have levelling means which are 10 attached to the side rails and used on unlevel ground. The levelling means are extended downward from the side rails of the ladder so as to reach the ground and level the ladder. However, such levelling means do not contribute to the lateral stability of the ladder.

United States Patent No. 3,059,723, entitled 15 EXTENSION LADDER WITH A REMOVABLE ANTI-TILTING BRACE which issued to C. Shore on October 23, 1962 is an example of a ladder stabilizer which increases the ladder support base for more lateral stability. Shore discloses 20 a removable anti-tilting brace for an extension ladder. The anti-tilting brace has two parallel rods that pass through hollow rungs of a ladder and extend beyond each side rail to upright support members. Each of the support members has its upper portions angled in the

direction of the side rails. The brace is divided in two halves for removable insertion into the hollow rungs from each side rail. A ground engaging cap is provided at the lower end of each upright support member. However, the
5 removable anti-tilting device disclosed by Shore is not adjustable and, therefore, cannot support the ladder on uneven ground.

United States Patent No. 5,423,397, entitled LADDER STABILIZER which issued to Boughner on 10 June 13, 1995 is another example of an apparatus for increasing the lateral support base for an extension ladder. Boughner discloses a ladder stabilizer with a structure that passes through hollow rungs of a ladder and extends beyond each side rail to upright members 15 having a base adapted to rest on the ground. There is a structure within each upright member to adjust the height of the upright members to compensate for the slope of the ground and provide lateral stability to the ladder. However, the structure for adjusting the height of the
20 upright member is relatively complex and includes a screw-threaded shaft portion which is engaged by a threaded member at the top of the extension shaft (as shown in FIG. 4). It is well known that the manufacture of such an assembly is relatively expensive. Another

disadvantage of this ladder stabilizer is that it is not convenient to use on very uneven ground where many long adjustments are required. A third disadvantage of this ladder stabilizer is that the long screw-threaded shaft 5 must be robust in order to avoid collapse under load. Therefore, this ladder stabilizer is necessarily heavy.

A similar structure for a ladder stabilizer is disclosed in Canadian Patent No. 260,767, entitled LADDER STABILIZER which issued to Magarvey et al. on 10 January 12, 1971. The stabilizer disclosed in this patent comprises a horizontal member and a pair of legs, each one of which is terminated by a spiked foot member. A pair of arms vertically connected to the horizontal member have upright portions and inwardly directed 15 portions for engagement with the interior of a hollow ladder rung (as shown in FIG. 1). The stabilizer disclosed in this patent is not adjustable.

United States Patent No. 4,971,167, entitled LADDER SUPPORT APPARATUS which issued to Winnard on 20 November 20, 1990 discloses a ladder support apparatus which comprises a pair of angular feet pivotally mounted to lower rungs of the ladder. Each leg has a telescoping extension locked by a pin. The ladder support apparatus disclosed in this patent does not provide lateral

stability, but it does teach a telescoping extension and a pin-lock structure used for ladder support, which provides a fast and coarse adjustment.

5 **SUMMARY OF THE INVENTION**

An object of the invention is to provide an improved ladder stabilizing device to overcome the shortcomings of the ladder stabilizers in the prior art.

Another object of the invention is to provide a 10 ladder stabilizing device to increase lateral stability at the base of the ladder to minimize the risk of sideways tilt on uneven ground.

A further object of the invention is to provide a ladder stabilizing device to increase lateral stability 15 at the base of a ladder with an adjustment mechanism which provides both a fast and coarse adjustment and an accurate and fine adjustment to facilitate set-up while ensuring optimal safety.

In accordance with one aspect of the invention, 20 there is provided a ladder stabilizing device for removable attachment to a ladder having side rails and vertically spaced rungs secured therebetween, at least a lower most two of the rungs being hollow for at least a

portion of their length and opened terminally through the side rails, comprising:

A pair of braces, each having a support member with a ground engaging portion and two parallel connection members respectively carried by the support member so that the ground engaging portion is laterally spaced from a corresponding one of the side rails when the two parallel connection members are engaged respectively in the hollow rungs to increase a lateral support base of the ladder; and

an adjustable supportive linkage between the support member and the ground engaging portion, including a first adjustment mechanism adapted to provide a fast and coarse extension adjustment of the ground engaging portion, and a second adjusting device adapted to provide an accurate and fine extension adjustment so that the ladder stabilizing device is adapted to be used while the ladder is positioned on uneven ground. The support member and the adjustable supportive linkage define a single longitudinal axis which is oriented at an acute angle with respect to the side rails such that the ladder stabilizing device meets ground at an oblique angle and thereby resists sinking into the ground.

The adjustable supportive linkage preferably comprises an elongated extension member having opposite ends respectively adjustably connected to the support member and to the ground engaging portion.

5 The first adjustment mechanism preferably comprises a pin which selectively engages equally spaced apertures in the support member and the elongated extension member, respectively. The apertures extend transversely through the support member and the elongated
10 extension member. The pin is selectively inserted through one of the apertures in the support member and one of the apertures in the elongated extension member so that the position of the elongated extension member relative to the support member is adjustable and
15 lockable. The second adjusting device includes a pair of adjustable connectors in threaded connection with each other. One of the adjustable connectors is secured to a free end of the elongated extension member and the other connector is secured to the ground engaging portion.

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BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be more fully explained by way of example only and with reference to the accompanying drawings, in which:

FIG. 1 is a partial perspective view of a ladder with a ladder stabilizing device in accordance with the invention to be engaged in the hollow rungs;

5 FIG. 2 is an enlarged sectional view of a circular area indicated by reference numeral 2 in FIG. 1, showing the telescoping pin lock structure of the adjustable supportive linkage of the support member;

10 FIG. 2A is a partial plan view of the pin lock structure taken from the direction indicated by arrow A in FIG. 2;

FIG. 2B is a side view of a cotter pin alternatively used in the embodiment;

15 FIG. 3 is an enlarged sectional view of a circular area indicated by the reference numeral 3 in FIG. 1, showing the details of one embodiment of the ground-engaging portion in threaded connection to an elongated extension member;

20 FIG. 4 is an enlarged sectional view of another embodiment of the ground-engaging portion in threaded connection to the elongated extension member;

FIG. 5 is a partial elevational view of the combination of the ladder with the ladder stabilizing device, showing an application thereof on uneven ground; and

FIG. 6 is a partial elevational view of the combination of the ladder with the ladder stabilizing device, showing another application thereof on uneven ground.

5

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

It is well known that extension ladders are prone to side slip. When a person on an extension ladder leans to one side or the other, the ladder may tilt sideways and fall. FIG. 1 illustrates a perspective view of a ladder stabilizing device 10 of this invention about to be mounted to a base of a typical metal ladder having a right side rail 12 and a left side rail 14 with a plurality of hollow rungs therebetween such as, for example, hollow rung 16 with aperture 18 at one end thereof. The aperture 18 extends all the way through the rung and through the side rails 12 and 14. Bottom rung 20 has one aperture 22 in the left side rail 14 extending all the way through the bottom rung 20 to the other aperture 24 in the right side rail 12. Similarly, second rung 26 located directly above the bottom rung 22 of the ladder, has one aperture 28 in the left side rail 14 and another aperture 30 in the right side

rail 12, which apertures extend all the way through the hollow second rung 26.

The ladder stabilizing device 10 includes two identical braces of tubular construction. Each brace has 5 a support member 32 and two parallel connection members 34 and 36. The support member 32 and the connection member 34 are formed integrally from a tubular material bent at an angle of about 135°. Therefore, the support member 32 extends downwardly and outwardly at an 10 angle of about 45° from the side rails 12 and 14. The external dimension of the tubular material is smaller but approximate of the size of apertures 28 and 30 so that when the connection member 34 is inserted in the aperture 28 or 30, it fits snugly. The second connection 15 member 36 is made of similar tubular material and is welded at its one end to the support member 32, parallel to the connection member 34. An elongated extension member 38 is in a telescoping connection with the support member 32. The elongated extension member 38 may also be 20 made of a tubular material. It has an external dimension that is less but approximate the internal diameter of the support member 32 so that the elongated extension member 38 is slidably engaged in the support member 32 to permit an adjustable extension of the support member 32.

The elongated extension member 38 has a length about the same as that of the support member 32. A pin lock structure is provided for locking the extension member 38 relative to the support member 32.

FIG. 2 illustrates details of the telescoping pin lock structure. Two groups of apertures 40, 42 are respectively provided in the support member 32 and the elongated extension member 38. Each of the groups of apertures 40 and 42 is equally spaced apart on the support member 32 and the elongated extension member 38, respectively. Each aperture 40 and 42 extends transversely through the support member 32 and the elongated extension member 38, respectively. A pin 44 selectively extends through one of the apertures 40 in the elongated extension member 38 and one of the apertures 42 in the support member 32 so that the position of the elongated extension member 38 relative to the support member 32 is adjustable and lockable. A lock tumbler 46 is pivotally engaged in a slot of one end of the pin 44 as shown in FIG. 2A and can be rotated, as indicated by arrow C, to extend transversely through the pin 44, to prevent the pin from sliding out, as shown in the locked position 48 in FIG. 2. Alternatively, a cotter pin illustrated in FIG. 2B may be inserted into

the selected apertures 40, 42 to lock the support member 32.

As shown in FIG. 1, a ground engaging extension portion 50 is provided at the lower end of the elongated extension member 38. Details of preferred embodiments of the ground engaging extension portion 50 are illustrated in FIG. 3 and FIG. 4. One of the embodiments of the ground engaging extension portion, as shown in FIG. 3, includes a resilient ground engaging base 54 secured to a lower end of a bolt 52. The resilient ground engaging base 54 is preferably a round foot. At the lower end of the elongated extension member 38 female threads 56 engage male threads of the bolt 52. A socket 58 behind the female threads 56 has a diameter larger than that of the bolt 52 and a length at least as long as the distance between two adjacent apertures 40. The male threads on the bolt 52 have a length about equal to a sum of the length of the female threads 56 and the length of the socket 58. Such a structure permits the bolt 52 to be threadedly connected to the elongated extension member 38 with an adjustable extension length not less than the length of two adjacent apertures 40 so that the telescoping and pin-lock structure is adapted to provide fast and coarse extension adjustment, and the threaded

connection of the ground engaging portion 50 is adapted to provide a supplementary accurate and fine extension adjustment. The round portion 54 is adapted to provide a secure engagement with the ground when the ground 5 engaging extension portion 50 is properly adjusted.

FIG. 4 illustrates another embodiment of the ground engaging extension of the invention. Similar to the ground engaging extension portion 50 shown in FIG. 3, the ground engaging extension portion 60 comprises a bolt 62 and a resilient ground engaging base 64 secured to the lower end of the bolt 62. The male threads of the bolt 62 are engaged with the female threads 56 of the elongated extension member 38 for an accurate and fine extension adjustment as described above. The difference 15 in this embodiment is in the resilient ground engaging base 64, which is substantially frusto-conical rather than round. The advantage of a frusto-conical shaped ground engaging base is that it provides a planar ground engagement face which has a larger ground contact surface 20 than that of a round foot and therefore provides a more frictional engagement with the ground. However, an adjustment must be provided to permit the planar ground engagement face of the ground engaging base 64 to be rotated to a position parallel to the ground. The ground

engaging base 64 is therefore secured to a sleeve 66 rather than secured directly to the bolt 62. The sleeve 66 is rotatably engaged with the lower end of the bolt 62 and is axially restrained by a washer 68 which is 5 secured to a lower end of the bolt 62 using a screw 70, for example. The sleeve 66 retains the ground engaging base 64 in a proper position while the bolt 64 is rotated for adjustment. A knurled grip 72 is preferably fixed to the bolt 62 and is rotatable together with the bolt 62. 10 A ladder user can easily rotate the knurled grip 72 to adjust the ground engaging portion 60.

FIG. 5 illustrates a use of the ladder stabilizing device 10 which supports the ladder laterally on uneven ground. Each brace of the ladder stabilizing 15 device supports an opposite side of the ladder. The two parallel connection members 34 and 36 are spaced conformably with the lowermost two rungs 20 and 26. The connection members 34 have a length that is approximately half of the width of the ladder. Consequently, the 20 ladder stabilizing device is roughly self-centralizing when the two connection members 34 are inserted in the hollow rung 26 and abut end-to-end. When the ladder stabilizing device is installed on the ladder, the ground engaging portions 50 or 60 are laterally spaced

from the side rails 12, 14 of the ladder to form a triangular side support with the corresponding side rails of the ladder. Therefore, an increased lateral support base for the ladder is provided.

5 The height of the ladder stabilizing device 10 should be less than the distance from the second rung 26 to the bottom of the ladder when the ladder stabilizing device is adjusted to a minimum extension. This permits the device to be used on uneven ground when the ground to
10 a side of the ladder is higher than the ground on which the ladder rests, as illustrated in FIG. 6.

In operation, the user engages the connection member 34 and 36 of each brace respectively in the apertures 28 and 22, 30 and 24 from each side of the
15 ladder and pushes each brace inwardly until the ends of the connection members 34 meet in the middle of the rung 26. A coarse adjustment of extension member 38 is made to place the ground engaging portion 50 close to ground level by selecting an pair of appropriate
20 apertures 40 and 42 and inserting the pin 44 therethrough. The extension length may be different on each side, as shown in FIG. 5, where the left side extension member 38 is extended farther than that of a right side extension member 38. Finally, a fine

adjustment is completed by turning the bolt 52, 62 to extend the ground engaging base 54, 64 until it is in firm contact with the ground.

The ladder stabilizing device of this invention provides a simple but functional structure for a removable attachment to a metal extension ladder. However, the ladder stabilizing device of this invention is not limited to use with metal extension ladders. It can be used with any type of ladder having hollow rungs to receive the connection members of the device.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE
PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A ladder stabilizing device for removable attachment to a ladder having side rails and vertically spaced rungs secured therebetween, at least a lowermost two of the rungs being hollow for at least a portion of their length and open terminally through the side rails, comprising:
 - 10 a pair of braces each having a support member with a ground-engaging portion and two parallel connection members respectively carried by the support member so that the ground-engaging portion is laterally spaced from a corresponding one of the side rails when
 - 15 the two parallel connection members are engaged respectively in the two hollow rungs to increase a lateral support base of the ladder;
- 20 an adjustable supportive linkage between the support member and the ground-engaging portion, including a first adjustment device adapted for providing a fast and coarse extension adjustment of the ground-engaging portion and a second adjustment device adapted for providing an accurate and fine extension adjustment so that the ladder stabilizing device is adapted to be used

while a base of the ladder is supported on uneven ground; and

wherein said support member and adjustable supportive linkage define a single longitudinal axis 5 which is oriented at an acute angle with respect to said side rails such that said ladder stabilizing device meets ground at an oblique angle and thereby resists sinking into the ground.

10 2. A ladder stabilizing device as claimed in claim 1 wherein the adjustable supportive linkage comprises an elongated extension member having opposite ends respectively adjustably connected to the support member and the ground-engaging portion.

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3. A ladder stabilizing device as claimed in claim 2 wherein the first adjustment device comprises a pin for engaging equally spaced apertures, each of the equally spaced apertures spaced longitudinally apart on the 20 support member and on the elongated extension member respectively, each of the apertures extending transversely through the support member and the elongated extension member, the pin selectively extending through one of the apertures in the support member and one of the

apertures in the elongated extension member so that the position of the elongated extension member relative to the support member is adjustable and lockable; and

the second adjusting device includes a pair of
5 adjustment connectors in threaded connection, one of the connectors being secured to a free end of the elongated extension member and the other connector being secured to the ground-engaging portion to achieve the fine adjustment.

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4. A ladder stabilizing device as claimed in claim 3 wherein the second adjusting device has an adjustment travel that is not less than a distance between two adjacent apertures for coarse adjustments.

15

5. A ladder stabilizing device as claimed in claim 3 wherein the one of the connectors is a female threaded part and the other of the connectors is a male threaded part.

20

6. A ladder stabilizing device as claimed in claim 5 wherein the elongated extension member is hollow, the female threaded part being formed integrally therewith.

7. A ladder stabilizing device as claimed in claim
5 wherein the ground-engaging portion is formed
integrally with the male threaded part and includes a
resilient ground-engaging base secured to a lower end
5 thereof.

8. A ladder stabilizing device as claimed in claim
1 wherein the two parallel connection members are spaced
conformably with that of the lowermost two rungs, an
10 external diameter of each connection member being less
than but approximating an internal diameter of the rungs
to permit removable insertion of the connection members
into the respective hollow rungs.

15 9. A ladder stabilizing device as claimed in claim
1 wherein the support member is connected to the two
parallel connection members at an angle so that when the
two connection members are engaged respectively in the
two hollow rungs, the brace forms a triangular side
20 support to the corresponding side rail of the ladder.

10. A ladder stabilizing device as claimed in claim
9 wherein each of the connection members has a length
such that the ladder stabilizing device is centralized

about the ladder when the connection members of the two braces are inserted respectively from each side and the pair of connection members meet end to end at a center of one of the rungs.

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11. A ladder stabilizing device as claimed in claim 1 wherein the ladder stabilizing device has a minimum height less than a distance from an upper one of the lowermost two rungs to a bottom of the ladder.

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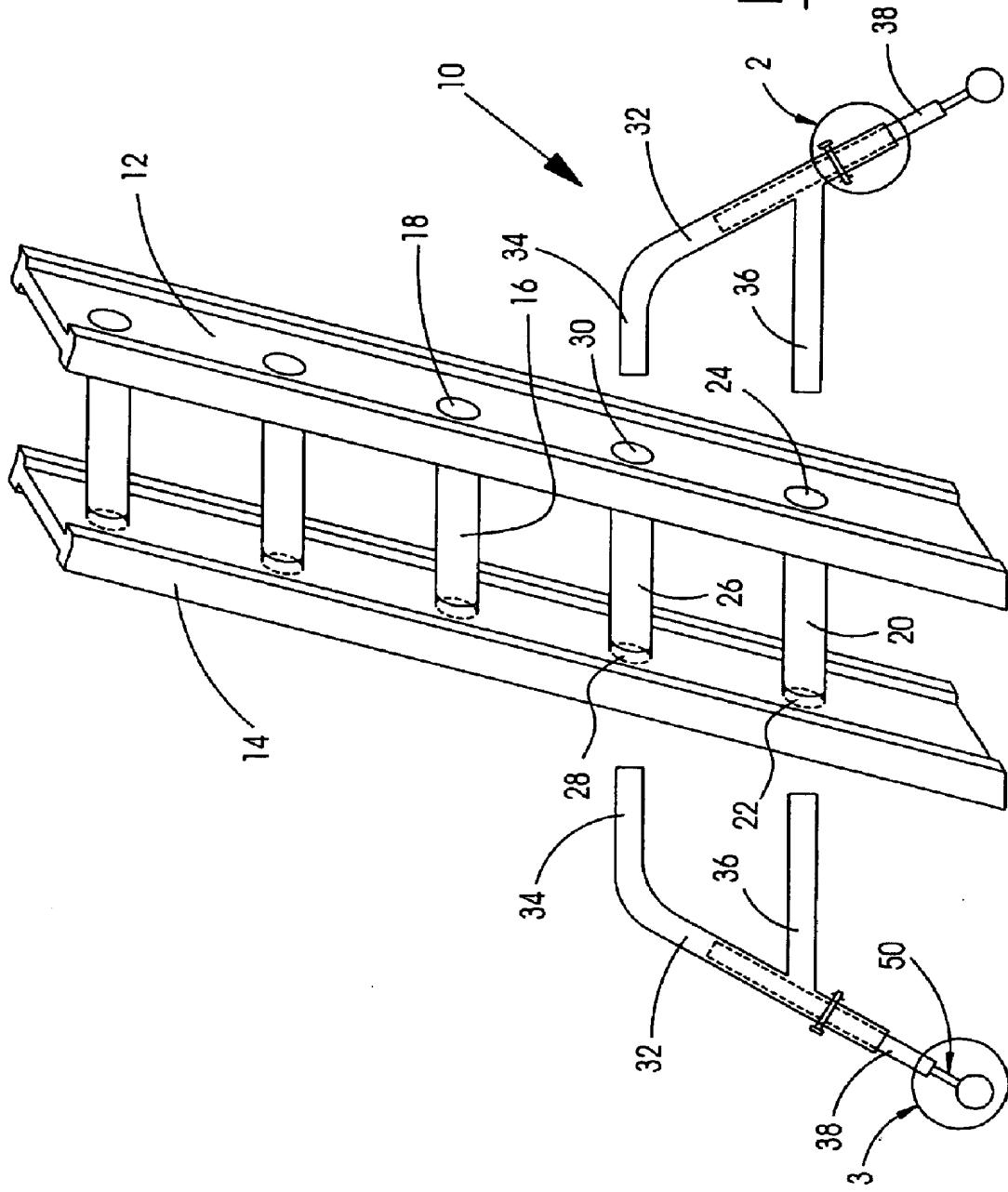
FIG. 1

FIG. 3

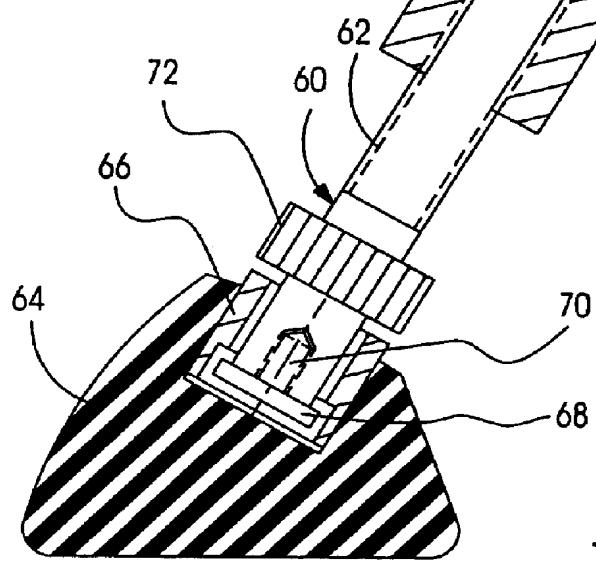
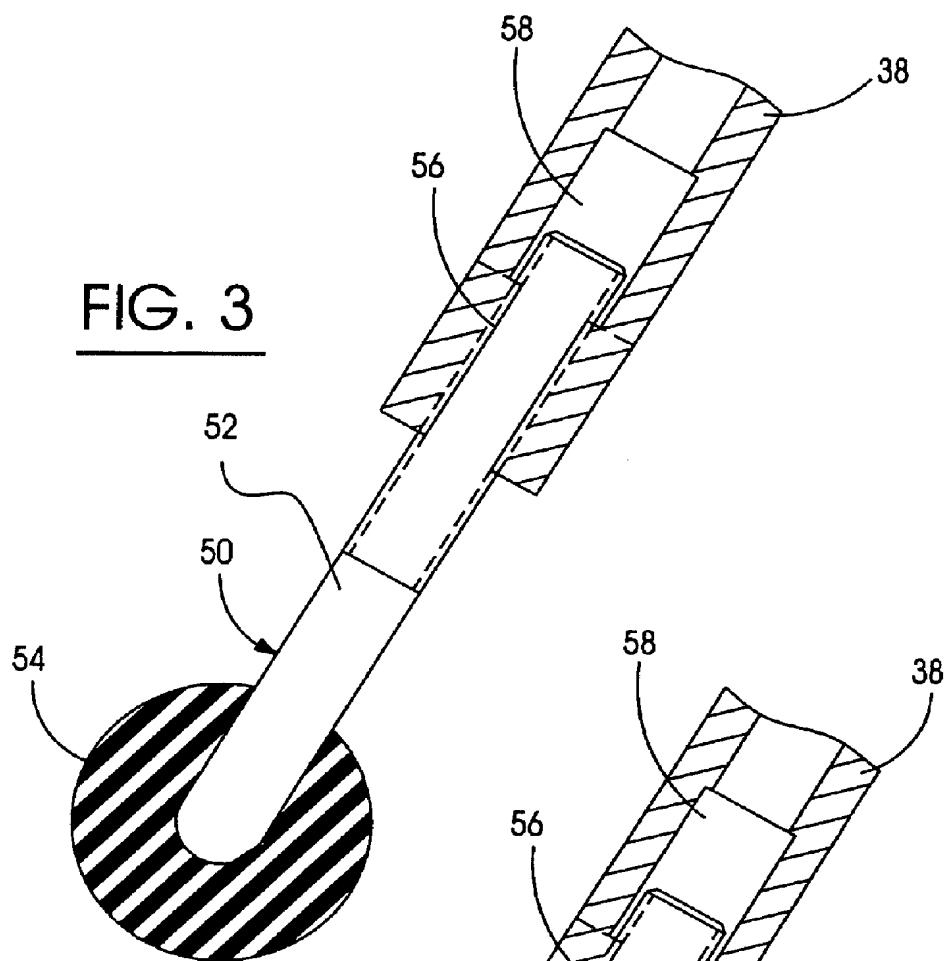


FIG. 4

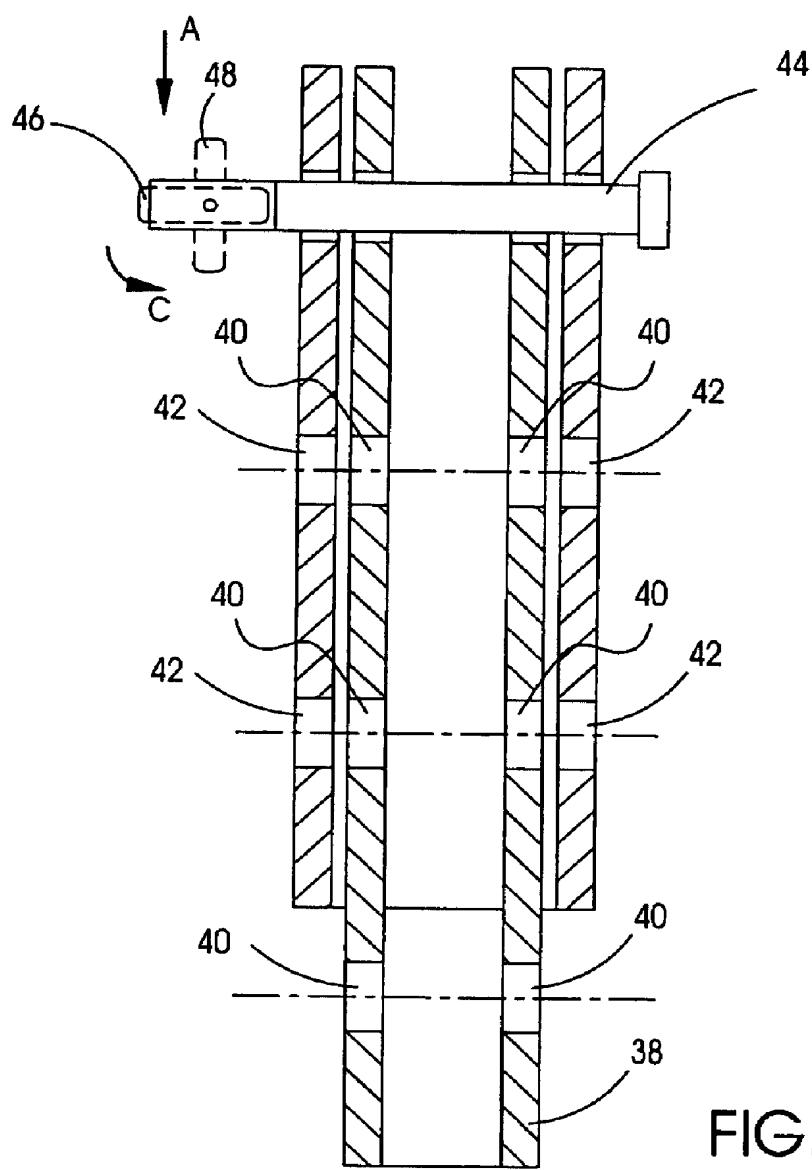


FIG. 2

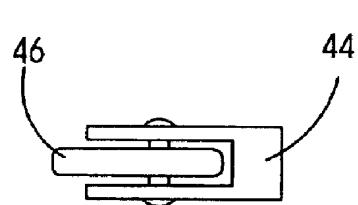


FIG. 2A

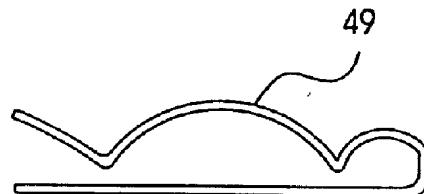


FIG. 2B

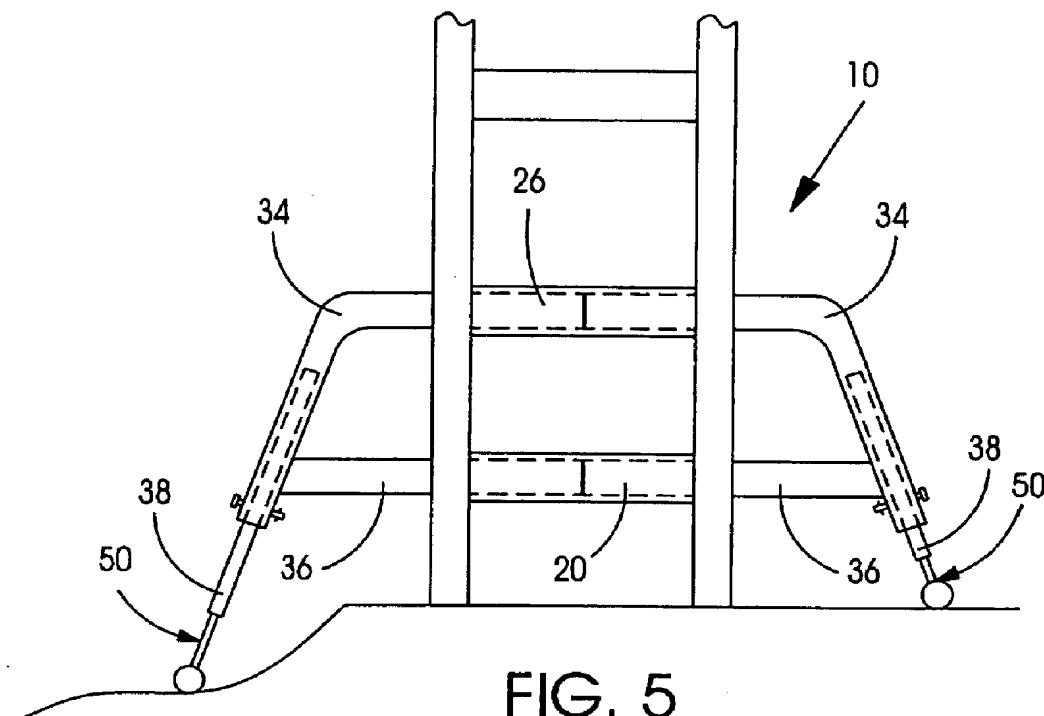


FIG. 5

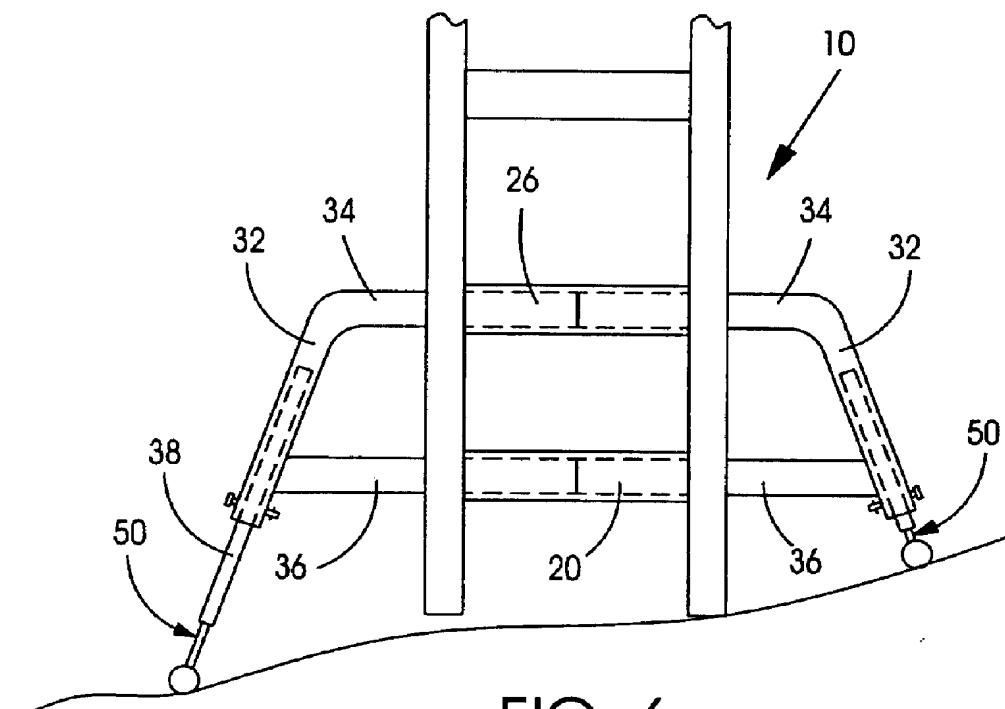


FIG. 6